

PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

SUZUKI, Takako, et al.

Attorney Docket No.: Q67844

Divisional of Appln. No.: 09/322,978

Group Art Unit: 1752

Confirmation No.: Unknown

Examiner: Unknown

Filed: February 28, 2002

For: POSITIVE PHOTORESIST COMPOSITION AND PROCESS FOR FORMING
RESIST PATTERN USING SAME

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as
follows:

IN THE SPECIFICATION:

Amend the specification by inserting before the first line the
sentence:

This is a divisional of Application No. 09/322,978 filed June 1, 1999, allowed;
the disclosure of which is incorporated herein by reference.

Please amend the specification as follows:

Replace the 2nd paragraph of Page 1 with the following paragraph:

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Positive photoresist compositions comprising an alkali-soluble resin and a quinonediazide ester have been satisfactorily applied in practice for the production of semiconductor devices and liquid-crystal display devices, since they have excellent definition, sensitivity and etching resistance.

Replace the paragraph bridging pages 8-9 with the following paragraph:

FIG. 1 illustrates a developing process and locations for the evaluation of sensitivity on resist patterns in the examples of the invention;

IN THE CLAIMS:

Please cancel claim 5 without prejudice or disclaimer.

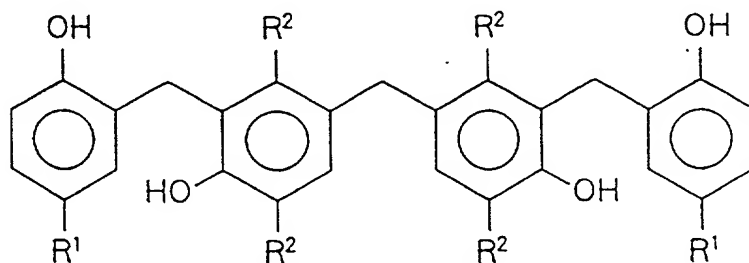
Please enter the following amended claims:

Please add the following new claims:

7 (new). A positive photoresist composition comprising

(A) an alkali soluble resin,

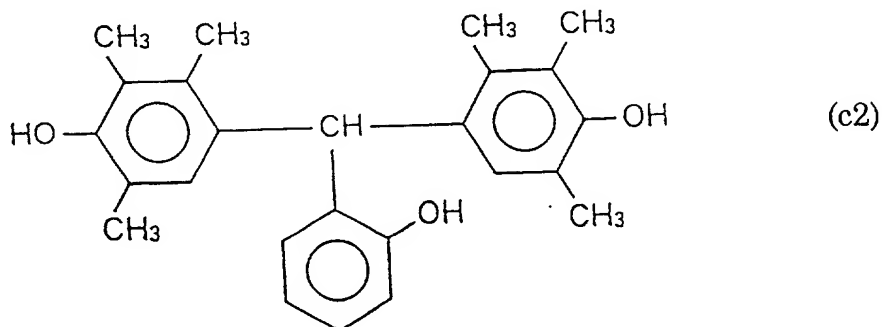
(B) a photosensitizer containing a quinonediazide ester of a compound of the following formula (I):



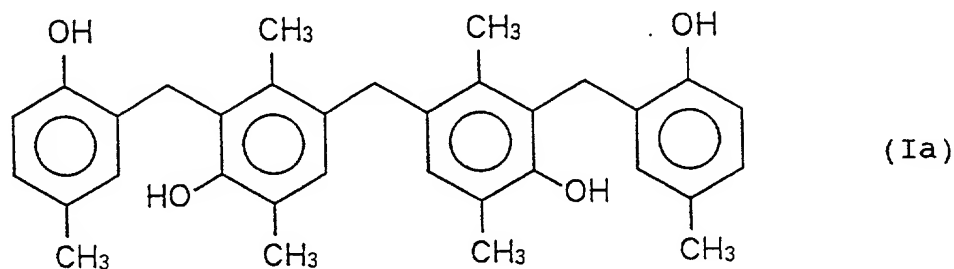
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wherein each of R¹ and R² is independently a methyl group or an ethyl group, and

(C) at least one compound of phenol group-containing compounds having structural formula (C2) and having an elution time in the range from 6 to 30 minutes in high performance liquid chromatography, said high performance liquid chromatography being conducted under the following conditions: eluent: a mixed solvent of water:tetrahydrofuran:methanol = 40:24:36 (by weight); column: 4.6 mm (diameter) x 150 mm (length) containing 5 μ m silica gel as a filler (carbon content being about 15%); column temperature: 45.0°C; and supply rate of eluent: 0.700 ml/min

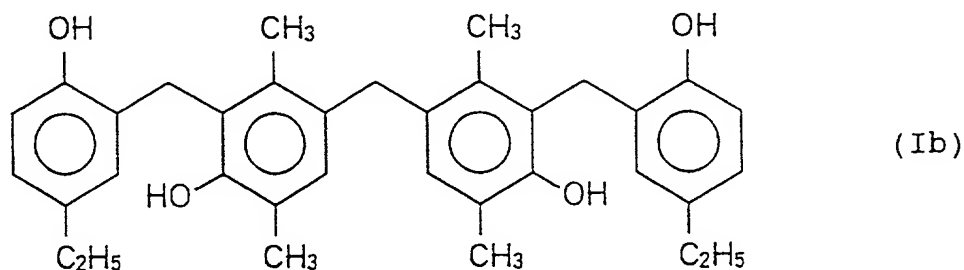


8 (new). The composition according to claim 7, wherein said compound represented by the formula (I) is a compound of the following formula (Ia):



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9 (new). The composition according to claim 7, wherein said compound represented by the formula (I) is a compound of the following formula (Ib):



10 (new). The composition according to claim 7, wherein the content of Ingredient (C) ranges from 5% to 50% by weight relative to Ingredient (A).

11 (new). A process for forming a resist pattern comprising the steps of:

(1) coating the positive photoresist composition of claim 7 onto a substrate having a diameter ranging from 8 to 12 inches, and drying the coated substrate to form a resist film,

(2) subjecting said resist film to selective exposure through a mask,

(3) heating said resist film, and

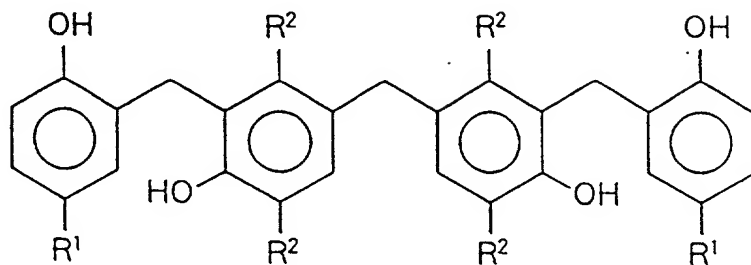
(4) removing the resist film at exposed positions by an aqueous alkali solution.

12 (new). A positive photoresist composition comprising

(A) an alkali soluble resin,

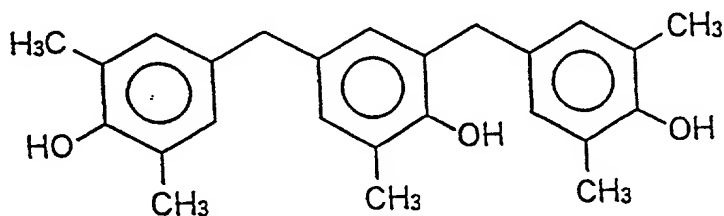
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(B) a photosensitizer containing a quinonediazide ester of a compound of the following formula (I):



wherein each of R^1 and R^2 is independently a methyl group or an ethyl group, and

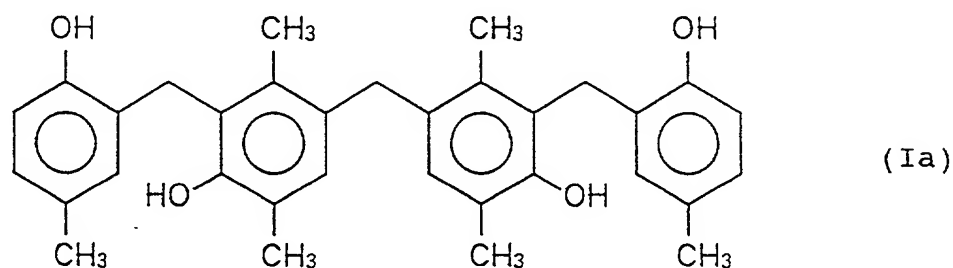
(C) at least one compound of phenol group-containing compounds having structure formula (C3) and having an elution time in the range from 6 to 30 minutes in high performance liquid chromatography, said high performance liquid chromatography being conducted under the following conditions:
eluent: a mixed solvent of water:tetrahydrofuran:methanol = 40:24:36 (by weight);
column: 4.6 mm (diameter) x 150 mm (length) containing 5 μ m silica gel as a filler (carbon content being about 15%); column temperature: 45.0°C; and supply rate of eluent: 0.700 ml/min



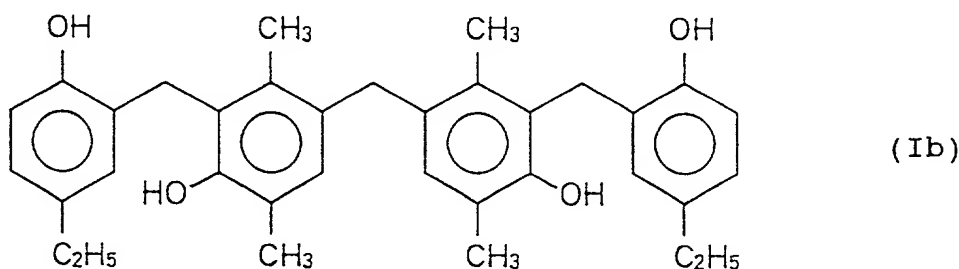
(c3)

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13 (new). The composition according to claim 12, wherein said compound represented by the formula (I) is a compound of the following formula (Ia):



14 (new). The composition according to claim 12, wherein said compound represented by the formula (I) is a compound of the following formula (Ib):



15 (new). The composition according to claim 12, wherein the content of Ingredient (C) ranges from 5% to 50% by weight relative to Ingredient (A).

16 (new). A process for forming a resist pattern comprising the steps of:

- (1) coating the positive photoresist composition of claim 12 onto a substrate having a diameter ranging from 8 to 12 inches, and drying the coated substrate to form a resist film,
- (2) subjecting said resist film to selective exposure through a mask,

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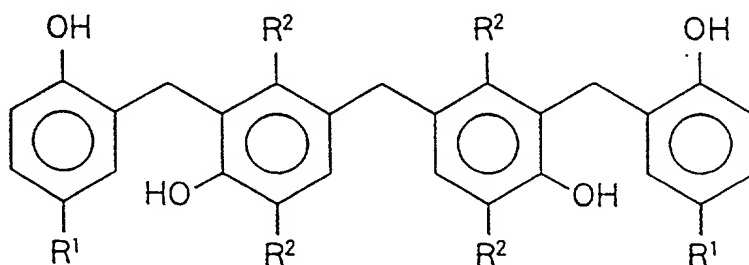
(3) heating said resist film, and

(4) removing the resist film at exposed positions by an aqueous alkali solution.

17 (new). A positive photoresist composition comprising

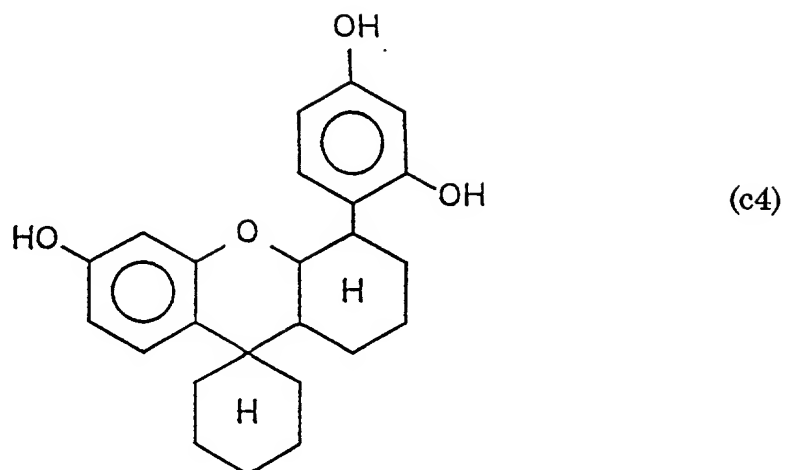
(A) an alkali soluble resin,

(B) a photosensitizer containing quinonediazide ester of a compound of the following formula (I):

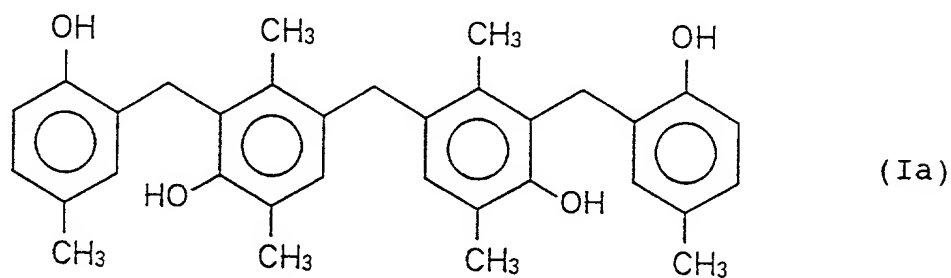


wherein each of R¹ and R² is independently a methyl group or an ethyl group, and

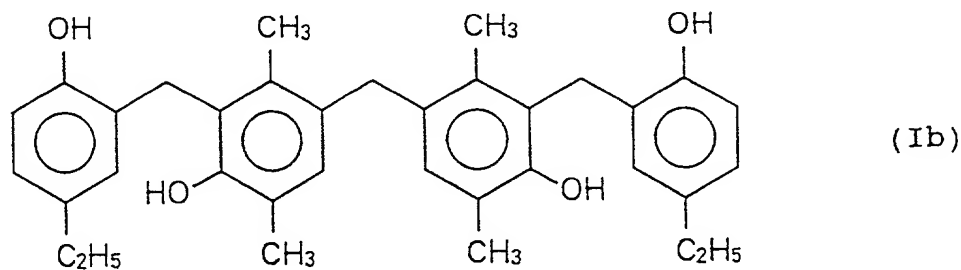
(C) at least one compound of phenol group-containing compounds having structural formula (C4) and having an elution time in the range from 6 to 30 minutes in high performance liquid chromatography, said high performance liquid chromatography being conducted under the following conditions: eluent: a mixed solvent of water:tetrahydrofuran:methanol = 40:24:36 (by weight); column: 4.6 mm (diameter) x 150 mm (length) containing 5 μ m silica gel as a filler (carbon content being about 15%); column temperature: 45.0°C; and supply rate of eluent: 0.700 ml/min.



18 (new). The composition according to claim 17, wherein said compound represented by the formula (I) is a compound of the following formula (Ia):



19 (new). The composition according to claim 17, wherein said compound represented by the formula (I) is a compound of the following formula (Ib):



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21 (new). A process for forming a resist pattern comprising the steps of:

(1) coating the positive photoresist composition of claim 17 onto a substrate having a diameter ranging from 8 to 12 inches, and drying the coated substrate to form a resist film,

(2) subjecting said resist film to selective exposure through a mask,

(3) heating said resist film, and

(4) removing the resist film at exposed positions by an aqueous alkali solution.

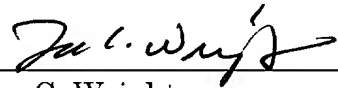
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REMARKS

Entry and consideration of this Amendment is respectfully requested.

Additionally, filed concurrently herewith is a sworn translation of the foreign
priority document.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Amend the specification by inserting before the first line the sentence:

This is a divisional of Application No. 09/322,978 filed June 1, 1999, allowed; the disclosure of which is incorporated herein by reference.

Page 1, 2nd paragraph, is changed as follows:

Positive photoresist compositions comprising an alkali-soluble resin and a quinonediazide ester have been satisfactorily applied in [practical to] practice for the production of semiconductor devices and liquid-crystal display devices, since they have excellent definition, sensitivity and etching resistance.

The paragraph bridging pages 8-9 is changed as follows:

FIG. 1 illustrates a developing process and locations for the evaluation of sensitivity on resist [patters] patterns in the examples of the invention;

IN THE CLAIMS:

Claim 5 is canceled.

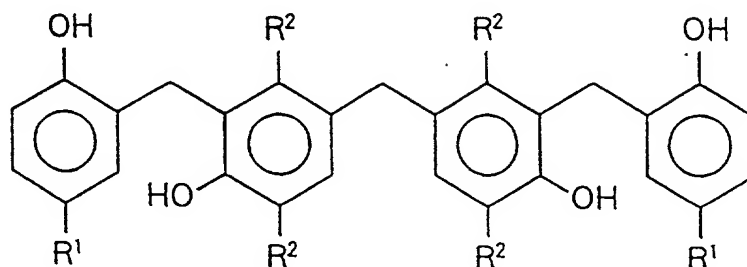
The claims are amended as follows:

1 (Amended). A positive photoresist composition comprising

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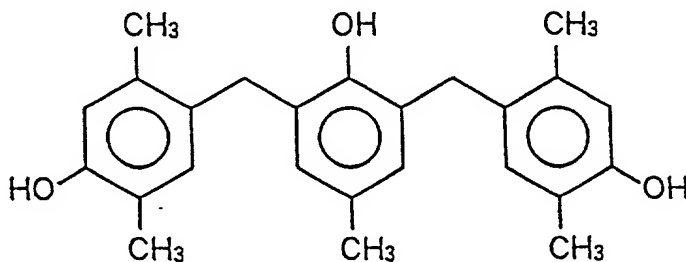
(A) an alkali soluble resin,

(B) a photosensitizer containing a quinonediazide ester of a compound of the following formula (I):



wherein each of R^1 and R^2 is independently a methyl group or an ethyl group, and

(C) at least one compound of phenol group-containing compounds having structural formula (C1) and having an elution time in the range from 6 to 30 minutes in high performance liquid chromatography, said high performance liquid chromatography being conducted under the following conditions:
eluent: a mixed solvent of water:tetrahydrofuran:methanol = 40:24:36 (by weight);
column: 4.6 mm (diameter) x 150 mm (length) containing 5 μ m silica gel as a filler (carbon content being about 15%); column temperature: 45.0°C; and supply rate of eluent: 0.700 ml/min



(c1)

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Claims 7-21 are added as new claims.